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IN THE UNITED STATES PATENT & TRADEMARK OFFICE

IN RE APPLICATION OF	:
Hiroshi KANNAN, et al.	: EXAMINER: GOLIGHTLY, ERIC W.
SERIAL NO: 10/525,797	:
FILED: FEBRUARY 25, 2005	: GROUP ART UNIT: 1792
FOR: SUBSTRATE PROCESSING UNIT, METHOD OF DETECTING END POINT OF CLEANING OF SUBSTRATE PROCESSING UNIT, AND METHOD OF DETECTING END POINT OF SUBSTRATE PROCESSING	:

APPEAL BRIEF WITH APPENDICES

COMMISSIONER FOR PATENTS
ALEXANDRIA, VIRGINIA 22313

SIR:

This is an appeal from a final Office Action dated July 22, 2009. A Notice of Appeal was timely filed together with a Pre-Appeal Brief Request for Review on January 15, 2010. A Notice of Panel Decision from Pre-Appeal Brief Review was mailed on March 8, 2010, indicating the application remains under appeal and the time for filing an Appeal Brief has been reset to one month from the mailing date of the Notice of Panel Decision from Pre-Appeal Brief Review.

I. REAL PARTY IN INTEREST

The real party in interest in this appeal is TOKYO ELECTRON LIMITED, having an address at 3-6 AKASAKA 5-CHOME, MINATO-KU, TOKYO 107-8481, JAPAN. TOKYO ELECTRON LIMITED is the real parties in interest by way of assignment recorded in the U.S. Patent and Trademark Office at reel 017327, frame 0262.

II. RELATED APPEALS AND INTERFERENCES

Appellants, Appellants' legal representative and the assignees are aware of no appeals or interferences which will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

III. STATUS OF THE CLAIMS

Claims 1-14 and 17-21 are pending. Claims 1-5, 8-12 and 17-21 stand rejected, claims 6, 7, 13 and 14 are withdrawn from consideration, claims 15 and 16 are canceled, and the rejection of claims 1-5, 8-12 and 17-21 is herein appealed.

IV. STATUS OF THE AMENDMENTS

In a Final Office Action dated July 22, 2009 (hereinafter "Final Action"), the Examiner finally rejected claims 1-5, 8-12 and 17-21. No amendments to the claims have been submitted after the mailing of the Final Action. The attached Claims Appendix (section VIII) reflects claims 1-5, 8-12 and 17-21 as presently pending on appeal.

V. SUMMARY OF THE CLAIMED SUBJECT MATTER[1]

A. CLAIM 1.

Claim 1 recites a substrate processing unit. Figure 1 of the original disclosure illustrates a substrate processing apparatus that includes a processing vessel (2) that accommodates a substrate (W), a cleaning gas supply system (13) that supplies a cleaning gas into the processing vessel (2) to be used in performing a cleaning of an interior of the processing vessel (2), and an exhauster (63) that includes rotor blades (Figure 2, 66A) that exhaust the interior of the processing vessel by rotation of the rotor blades (66A). See the specification as originally filed at p. 10, ll. 1-18; p. 12, l. 23 to p. 13, l. 5; and p. 13, ll. 14-20.

FIG.5B

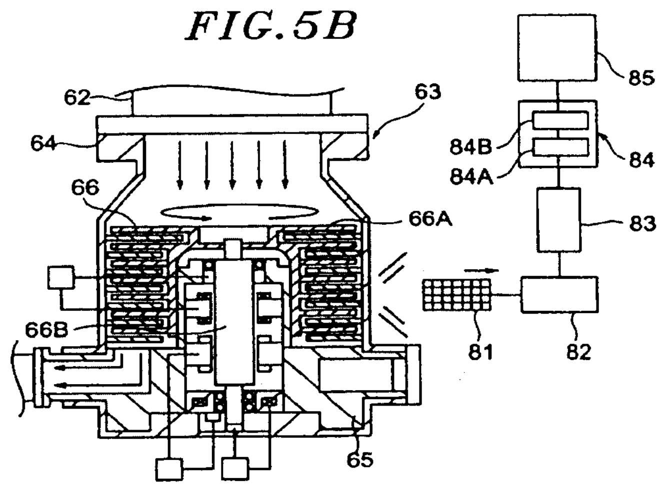

Figure 5B of the application on Appeal

[1] It is Appellants' understanding that, under the rules of Practice before the Board of Patent Appeals and Interferences, 37 C.F.R. § 41.37(c) requires that a concise explanation of the subject matter recited in each independent claim be provided with reference to the specification by page and line numbers and to the drawings by reference characters. However, Appellants' compliance with such requirements anywhere in this document should in no way be interpreted as limiting the scope of the invention recited in all pending claims, but simply as non-limiting examples thereof.

The substrate processing apparatus further includes, as illustrated in Figure 5B, reproduced above, an operating state detector (81-84) that detects effects of collisions between a gas and the rotor blades (66) so as to determine a change in an amount of or a molecular weight of the gas that passes through the exhauster (63); and an end point detector (84) that detects an end point of the cleaning based on a detection result from the operating state detector (81-84).

In the example shown in Figure 5B, as further explained at page 15, line 21 to page 17, line 3, a microphone (81) for measuring an intensity of a sound wave generated from a case 64 of the exhauster (63) is provided near the exhauster (63). An end point detector (84) is electrically connected to the microphone (81). The end point detector (84) includes a CPU (84B). The CPU (84B) detects the end point of the cleaning based on an output signal from the microphone (81). The CPU (84B) reads intensity information on a sound wave to thereby determine whether or not an intensity of the sound wave has declined.

As further explained at page 22, line 25 to page 23, line 12 of the specification as originally filed, "as a molecular weight of the gas colliding with the rotor blade 66A becomes smaller, the intensity of the sound wave declines; and as the amount of the gas colliding with the rotor blade 66A becomes smaller, the intensity of the sound wave declines. Meanwhile, the amount of a produced gas such as TiF_4 or the like decreases as the cleaning progresses. Therefore, as the cleaning progresses, the intensity of the sound wave produced from the case 64 declines. Further, by the time the gas is rarely produced to be discharged, the intensity of the sound wave becomes stable. Accordingly, the end point of the cleaning can be detected based on the change in the intensity of the sound wave produced from the case 64. As a

result, without the generation of a plasma, it is possible to detect the end point of the cleaning."

In another non-limiting example, Figure 9, reproduced below, illustrates an operating state detector (91, 82-84) that detects effects of collisions between a gas and the rotor blades (66) so as to determine a change in an amount of or a molecular weight of the gas that passes through the exhauster (63); and an end point detector (84) that detects an end point of the cleaning based on a detection result from the operating state detector (91, 82-84).

FIG. 9

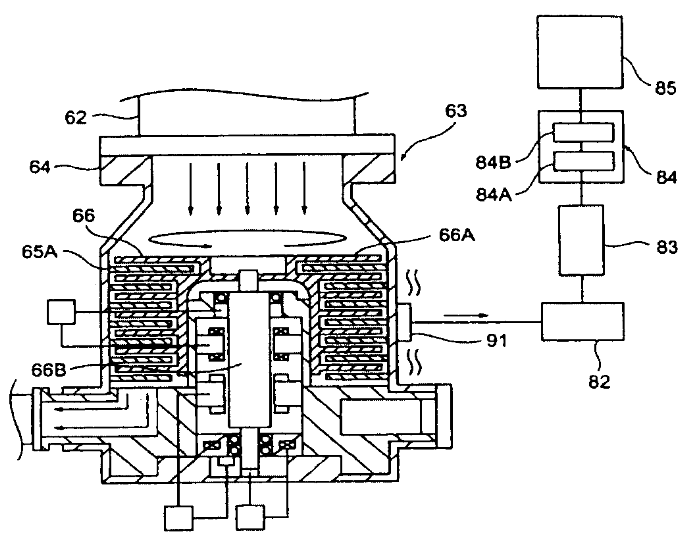

Figure 9 of the application on Appeal

In this example, as explained at page 23, line 23 to page 24, line 1 of the specification as originally filed, a piezoelectric sensor 91 is fixed on the case 64 in order to measure intensity of a vibration of the case 64. The piezoelectric sensor 91 is electrically connected to the end point detector 84.

In a further non-limiting example, Figure 12, reproduced below, illustrates an operating state detector (68, 84) that detects effects of collisions between a gas and the rotor blades (66) so as to determine a change in an amount of or a molecular weight of the gas that passes through the exhauster (63); and an end point detector (84) that detects an end point of the cleaning based on a detection result from the operating state detector (68, 84).

FIG. 12

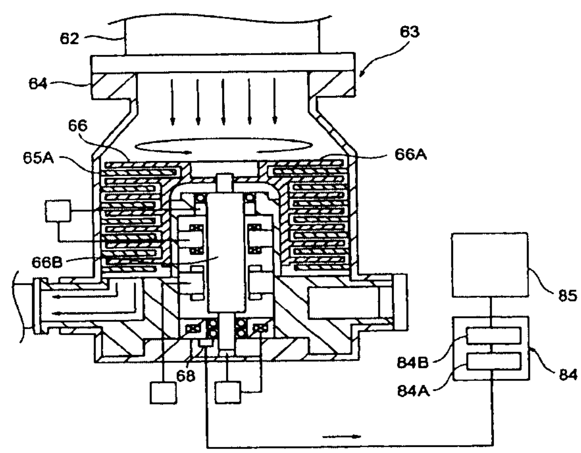

Figure 12 of the application on Appeal

In this example, as explained at page 26, lines 1-6 of the specification as originally filed, a rotational frequency sensor (68) is electrically connected to the end point detector (84). As further explained at page 28, lines 1-22, "the rotational frequency of the rotor 66 is measured, and then, an end point of the cleaning is detected based on a change in the rotational frequency. Therefore, the end point of the cleaning can be detected without the generation of plasma. In detail, the rotational frequency of the rotor 66 changes depending on a type and an amount of a gas discharged from the chamber 2. Specifically, as a

molecular weight of a gas colliding with the rotor blade 66A becomes smaller, the rotational frequency increases; and as the amount of the gas colliding with the rotor blade 66A becomes smaller, the rotational frequency increases. This is because a load applied to the rotor blade 66A is reduced. Meanwhile, the production of a gas such as TiF_4 or the like decreases as the cleaning progresses. Therefore, as the cleaning progresses, the rotational frequency of the rotor 66 increases. Further, by the time the gas is rarely produced to be discharged, the rotational frequency of the rotor 66 becomes stable. Accordingly, the end point of the cleaning can be detected based on the change in the rotational frequency of the rotor 66. As a result, without the generation of plasma, it is possible to detect the end point of the cleaning."

Although they relate to non-elected species, claim 1 also finds non-limiting support at least in, and is generic to, the examples illustrated in Figures 16 and 20 of the disclosure as originally filed.

B. CLAIM 4.

Claim 4 depends from claim 1 through claim 2. Claim 2 recites the operating state detector (81-84; or 91, 82-84) includes a vibration detector (81 or 91) that detects the change in the amount of or the molecular weight of the gas that collides with the rotor blades by detecting a vibration of the exhauster. See p. 15, l. 21 to p. 17, l. 3; and p. 23, l. 23 to p. 24, l. 1. Claim 4 recites the end point detector (84) detects the end point based on a change in the intensity of the vibration. See p. 22, l. 25 to p. 23, l. 12; and p. 24, l. 24 to p. 25, l. 14.

C. CLAIM 5.

Claim 5 depends from claim 1 and recites the exhauster (63) includes a rotatable body of revolution (66) for exhaust. See p. 13, ll. 14-20. The operating state detector (68, 84) includes a rotation detector (68) that detects the change in the amount of or the molecular

weight of the gas that collides with the rotor blades by detecting a rotation of the body of revolution. See p. 26, ll. 1-6; and p. 28, ll. 1-22.

D. CLAIM 8.

Claim 8 recites a substrate processing unit. Figure 1 illustrates a substrate processing apparatus that includes a processing vessel (2) that accommodates a substrate (W), a process gas supply system (12, 13) that supplies a process gas into the processing vessel (2) to be used in performing a processing on the substrate (2), an exhauster (63) that includes rotor blades (Figure 2, 66A) that exhaust the interior of the processing vessel by rotation of the rotor blades (66A). See the specification as originally filed at p. 10, ll. 1-18; p. 11, l. 25 to p. 12, l. 22; and p. 13, ll. 14-20.

Claim 8 further recites, as illustrated in Figure 5B, an operating state detector (81-84) that detects effects of collisions between a gas and the rotor blades (66) so as to determine a change in an amount of or a molecular weight of the gas that passes through the exhauster (63). Claim 8 further recites an end point detector (84) that detects an end point of the processing based on a detection result from the operating state detector (81-84). See p. 15, l. 21 to p. 17, l. 3; and p. 22, l. 25 to p. 23, l. 12. Figures 9, 12, 16 and 20 also illustrate examples that support the recitation in claim 8.

E. CLAIM 11.

Claim 11 depends from claim 8 through claim 9. Claim 9 recites the operating state detector (81-84; or 91, 82-84) includes a vibration detector (81 or 91) that detects the change in the amount of or the molecular weight of the gas that collides with the rotor blades by detecting a vibration of the exhauster. See p. 15, l. 21 to p. 17, l. 3; and p. 23, l. 23 to p. 24, l.

1. Claim 11 recites the end point detector (84) detects the end point based on a change in the intensity of the vibration. See p. 22, l. 25 to p. 23, l. 12; and p. 24, l. 24 to p. 25, l. 14.

F. CLAIM 12.

Claim depends from claim 8 and recites the exhauster (63) includes a rotatable body of revolution (66) for exhaust. See p. 13, ll. 14-20. The operating state detector (68, 84) includes a rotation detector (68) that detects the change in the amount of or the molecular weight of the gas that collides with the rotor blades by detecting a rotation of the body of revolution. See p. 26, ll. 1-6; and p. 28, ll. 1-22.

G. CLAIM 17.

Claim 17 depends from claim 1 and recites the end point detector detects the end point of the cleaning by determining whether the amount of or the molecular weight of a gas colliding with the rotor blades stabilizes with the progress of the cleaning following a period of initially instability. See p. 16, l. 11 to p. 17, l. 4; p. 22, l. 17 to p. 23, l. 12; p. 25, ll. 9-18; and p. 27. l. 15 to p. 28, l. 22.

H. CLAIM 20.

Claim 20 recites a substrate processing unit. Figure 1 illustrates a substrate processing apparatus that includes a processing vessel (2) that accommodates a substrate (W), a cleaning gas supply system (13, 51, 52, 53) that supplies a cleaning gas into the processing vessel (2) to be used in performing a cleaning of an interior of the processing vessel (2), an exhauster (63) that includes rotor blades (Figure 2, 66A) that exhaust the interior of the processing vessel by rotation of the rotor blades (66A). See the specification as originally filed at p. 10, ll. 1-18; p. 12, l. 23 to p. 13, l. 5; and p. 13, ll. 14-20.

Claim 20 further recites, as illustrated in Figure 5B, operating state detector means (81-84) for detecting effects of collisions between a gas and the rotor blades (66) so as to determine a change in an amount of or a molecular weight of the gas that passes through the exhauster (63). Claim 20 further recites means (84) for detecting an end point of the cleaning based on a detection result from the operating state detector means (81-84). See p. 15, l. 21 to p. 17, l. 3; and p. 22, l. 25 to p. 23, l. 12. Figures 9, 12, 16 and 20 also illustrate examples that support the recitation in claim 20.

I. CLAIM 21.

Claim 21 recites a substrate processing unit. Figure 1 illustrates a substrate processing apparatus that includes a processing vessel (2) that accommodates a substrate (W), a process gas supply system (12, 13) that supplies a process gas into the processing vessel (2) to be used in performing a processing on the substrate (2), an exhauster (63) that includes rotor blades (Figure 2, 66A) that exhaust the interior of the processing vessel by rotation of the rotor blades (66A). See the specification as originally filed at p. 10, ll. 1-18; p. 11, l. 25 to p. 12, l. 22; and p. 13, ll. 14-20.

Claim 21 further recites, as illustrated in Figure 5B, operating state detector means (81-84) for detecting effects of collisions between a gas and the rotor blades (66) so as to determine a change in an amount of or a molecular weight of the gas that passes through the exhauster (63). Claim 21 further recites means (84) for detecting an end point of the processing based on a detection result from the operating state detector means (81-84). See p. 15, l. 21 to p. 17, l. 3; and p. 22, l. 25 to p. 23, l. 12. Figures 9, 12, 16 and 20 also illustrate examples that support the recitation in claim 21.

VI. GROUNDS FOR REJECTION TO BE REVIEWED ON APPEAL

Whether claims 1-5, 8-12 and 17-21 are unpatentable under 35 U.S.C. § 103(a) over Tsukazaki (U.S. Patent No. 5,837,094) in view of Kubli (U.S. Patent No. 5,636,287).

VII. ARGUMENT

A. THE REJECTION OF CLAIMS 1-5, 8-12 AND 17-21 UNDER 35 U.S.C. § 103(A) AS UNPATENTABLE OVER TSUKAZAKI IN VIEW OF KUBLI.

1. Claims 1-3 and 8-10.

Claims 1 and 8 each recite a substrate processing unit that includes a processing vessel, an exhauster, an operating state detector and an end point detector. The substrate processing units of claims 1 and 8 differ in that claim 1 recites a cleaning gas supply system that supplies a cleaning gas into the processing vessel to be used in performing a cleaning of an interior of the processing vessel and claim 8 recites a process gas supply system that supplies a process gas into the processing vessel to be used in performing a processing on the substrate.

The exhauster recited in claims 1 and 8 includes rotor blades that exhaust the interior of the processing vessel by rotation of the rotor blades. The operating state detector detects effects of collisions between a gas and the rotor blades so as to determine a change in an amount of or a molecular weight of the gas that passes through the exhauster. The end point detector detects an end point of the cleaning (claim 1) or the processing (claim 8) based on a detection result from the operating state detector.

Thus, claims 1 and 8 each recite an end point detector that detects an end point of the cleaning (claim 1) or the processing (claim 8) based on a detection of the effects of collisions between a gas and a rotor blade that is performed so as to determine a change in an amount of or a molecular weight of the gas.

"Section 103 forbids issuance of a patent when 'the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole

would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.'" *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations including (1) the scope and content of the prior art, (2) any differences between the claimed subject matter and the prior art, (3) the level of skill in the art, and (4) where in evidence, so-called secondary considerations. *Graham v. John Deere Co.*, 383 U.S. 1, 17-18 (1966). *See also KSR*, 550 U.S. at 406-07 ("While the sequence of these questions might be reordered in any particular case, the [Graham] factors continue to define the inquiry that controls.").

"An appellant may attempt to overcome an examiner's obviousness rejection on appeal to the Board by submitting arguments and/or evidence to show that the examiner made an error in either (1) an underlying finding of fact upon which the final conclusion of obviousness was based, or (2) the reasoning used to reach the legal conclusion of obviousness." *Ex Parte Frye*, Appeal 2009-006013, p. 9 (BPAI, July 23, 2008) (precedential).

In this case, the examiner erred in finding Kubli teaches an operating state detector that detects effects of collisions between a gas and rotor blades of an exhauster so as to determine a change in an amount of or a molecular weight of the gas that passes through the exhauster. Further, the examiner's legal conclusion of obviousness improperly relies on conclusory statements rather than sound reasoning with some rational underpinning.

a) The combined teachings of Tsukazaki and Kubli fail to disclose or suggest an operating state detector that detects effects of collisions between a gas and rotor blades of an exhauster so as to determine a change in an amount of or a molecular weight of the gas that passes through the exhauster.

Tsukazaki relates to a semiconductor manufacturing apparatus that includes an end point detection controller and a particle monitor that includes a laser irradiation system.[2] For example, as shown in Figure 1 of Tsukazaki, reproduced below, an end point detection controller 31 observes a time-varying amount of generation of dust during a plasma cleaning, counted by a particle monitor 15, and decides that an end point is a time point when no tungsten fine particle (no generation of tungsten-dust) is generated.[3]

FIG.1

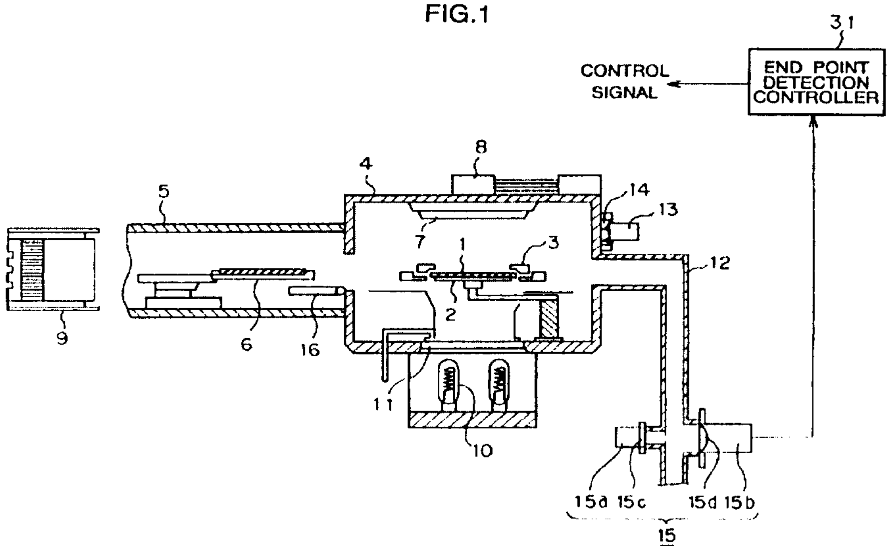

Figure 1 of Tsukazaki

The end point detection performed in Tsukazaki is *entirely separate from* the exhausting device of Tsukazaki. The device of Tsukazaki merely counts particles that pass a

[2] See Tsukazaki, at column 5, lines 53-64.
[3] See Tsukazaki, at column 7, lines 31-40.

laser-based monitoring device located *upstream* of the exhaust device of Tsukazaki. The number of particles that are detected *upstream* of the exhaust device of Tsukazaki is not the same as effects of collisions between a gas and the rotor blades of the exhausting device. Indeed, the examiner acknowledges Tsukazaki "does not explicitly teach the specifics of the pump or that the exhauster includes rotor blades."[4]

Kubli is solely concerned with cancellation of unwanted audible noises that emanate from rotating devices. For example, Kubli describes "[a]n error sensor 10 detects objectionable noise emanating from rotating machinery," and that this objectionable noise arises "from unsteady lift fluctuations, and from periodic events in the motion of the machinery."[5] The error sensor 10 "is employed to provide an input error noise signal to control circuit 320" and that the "output from control circuit 320 is a broad band signal, which can include some high amplitude discrete frequency tones, which cause actuator 340 to move actuator shaft 342 whereby broad band noise emanating from rotating machinery is reduced."[6] Kubli makes *no mention whatsoever* of (1) detecting effects of collisions between a gas and a rotor blade so as to determine a change in an amount of or a molecular weight of the gas, or (2) detecting an end point of a cleaning.

Nevertheless, the examiner found "the operating state detector of the apparatus as per the Tsukazaki/Kubli teachings is fully capable of being used to determine a change in the amount of the gas that passes through the exhauster."[7] This finding of fact is not based on evidence in the record. Although the device of Kubli describes detecting sound waves

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[4] See the Final Action, at the paragraph spanning pages 3 and 4.
[5] See Kubli, at col. 4, lines 8-16.
[6] See Kubli, at col. 6, lines 22-43.
[7] The Final Action, at page 5, lines 3-6, emphasis added.

emanating from a rotating machine, it does not necessarily follow that such a device is capable of the type of detection recited in either of claims 1 or 8: the detection of effects of collisions between a gas and a rotor blade so as to determine a change in an amount of or a molecular weight of a gas that passes through an exhauster.

The examiner's focus on what the device in Kubli is *capable of* is misplaced. Even if the device of Kubli is *capable of* determining a change in an amount of or a molecular weight of a gas that passes through an exhauster, Kubli neither describes modifying the detection circuits described therein to perform the function recited in claims 1 and 8, nor does Kubli make the claimed subject matter obvious. *See In re Prater*, 415 F.2d 1393, 1406 (CCPA 1969) ("Assuming the existence, at the time of the invention, of general-purpose digital computers as well as typical programming techniques therefor, it is nevertheless plain that appellants' invention, as defined in apparatus claim 10, was not obvious under 35 U.S.C. § 103 because one not having knowledge of appellants' discovery simply would not know what to program the computer to do."). *See also In re Mills*, 916 F.2d 680, 682 (Fed. Cir. 1990) ("While Mathis' apparatus may be capable of being modified to run the way Mills' apparatus is claimed, there must be a suggestion or motivation in the reference to do so."). *See also In re Fritch*, 972 F.2d 1260, 1266 (Fed. Cir. 1992) ("The mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification.").

In the present case, neither Tsukazaki nor Kubli even go so far as to possess the same functional characteristics of the end point detector recited in claims 1 and 8: detecting an end point of a cleaning (claim 1) or a processing (claim 8) based on a detection result from the operating state detector that detects effects of collisions between a gas and a rotor so as to

determine a change in an amount of or a molecular weight of the gas that passes through an exhauster.

Therefore, the examiner made an error in an underlying finding of fact upon which the final conclusion of obviousness was based. Specifically, the examiner erred in finding the combined teachings of Tsukazaki and Kubli either disclose or suggest an operating state detector that detects effects of collisions between a gas and rotor blades of an exhauster so as to determine a change in an amount of or a molecular weight of the gas that passes through the exhauster.

b) The examiner's legal conclusion of obviousness improperly relies on conclusory statements rather than sound reasoning with some rational underpinning.

The Final Action states "It would have been obvious to one of ordinary skill in the art at the time of the invention to include the means for detecting a change in an amount of a gas that collides with the rotor blades as per the apparatus of the Kubli teaching in the operating state detector of apparatus as per the Tsukazaki teaching in order to reduce objectionable sounds. It is noted that the operating state detector of the apparatus as per the Tsukazaki/Kubli teachings is fully capable of being used to determine a change in the amount of the gas that passes through the exhauster."[8]

As noted above, nothing in the record supports the examiner's conclusory statement that the combined teachings of Tsukazaki and Kubli are capable of performing the function recited in appealed claims 1 and 8. "[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *In re Kahn*,

[8] See the Final Action, at the paragraph spanning pages 4 and 5.

441 F.3d 977, 988 (Fed. Cir. 2006), *cited with approval in KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007).

The combined teachings of Tsukazaki and Kubli provide no link whatsoever between the detection of the effects of collisions between a gas and a rotor blade of an exhauster and an end point detector that detects an end point of a cleaning (claim 1) or a processing (claim 8). Instead, the teachings relating to end point detection in Tsukazaki are limited to a laser-based particle monitor upstream of an exhauster, and the teachings in Kubli are solely directed to active cancellation of unwanted noises emanating from rotating machinery. Thus, at best, incorporating the device of Kubli into the device of Tsukazaki would result in a system that performs the noise cancellation described in Kubli on the exhauster of Tsukazaki. Therefore, modifying the noise cancellation device of Kubli so as to perform the end point detection of the laser-based particle monitoring device of Tsukazaki involves more than a simple substitution of one known element for another.

The Supreme Court stated that in cases involving more than the simple substitution of one known element for another, or the mere application of a known technique to a piece of prior art ready for the improvement, it will be necessary to "determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue." *KSR* at 417-418. The Court noted that "[t]o facilitate review, this analysis should be made explicit." *KSR* at 418.

The examiner fails to articulate any apparent reason why one of ordinary skill in the art would find it obvious to modify the noise cancellation device of Kubli to detect an end point of a cleaning or a processing based on a detection result from an operating state detector that detects effects of collisions between a gas and a rotor blade so as to determine a change

in an amount of or a molecular weight of the gas that passes through an exhauster. Instead, the examiner improperly relies on an unsupported, conclusory statement that an apparatus that results from the combined teachings of Tsukazaki and Kubli is "capable of being used to" perform the functions of the devices recited in each of claims 1 and 8. As such, the examiner's legal conclusion of obviousness improperly relies on a conclusory statement rather than sound reasoning with some rational underpinning.

Accordingly, the examiner's rejection of claims 1 and 8 is improper because even the combined teaching of Tsukazaki and Kubli fail to disclose or suggest all of the features recited in claims 1 or 8. It is respectfully requested the rejections of claims 1 and 8 be REVERSED.

Although dependent claims 2, 3, 9 and 10 recite additional features which are patentable, particularly in combination with the features of the claims from which they depend, to simplify issues on appeal, Appellants do not separately argue patentability of the remaining claims of this group. These claims are patentable at least by virtue of their respective dependence upon claims 1 and 8.

2. Claims 4 and 11.

Claims 4 and 11 respectively depend from claims 1 and 8 through claims 2 and 9. Claims 2 and 9 each recite the operating state detector includes a vibration detector that detects the change in the amount of or the molecular weight of the gas that collides with the rotor blades by detecting a vibration of the exhauster. Claim 4 and 11 each recite the end point detector detects the end point based on a change in the intensity of the vibration. The examiner fails to point to any teachings in the cited references that either disclose or suggest

this combination of features. Therefore, the examiner erred by failing to (1) make any finding of facts with respect to the subject matter of claims 4 or 11 upon which the final conclusion of obviousness was based, or (2) articulate the reasoning used to reach the legal conclusion of obviousness.

Indeed, Tsukazaki describes a laser-based system of particle monitoring, and Kubli describes an audio-based system for noise cancellation. Neither of these references disclose or suggest an end point detector detects an end point of either cleaning or processing based on a change in the intensity of vibration a gas and rotor blades of an exhauster.

Accordingly, the examiner's rejection of claims 4 and 11 is improper because even the combined teaching of Tsukazaki and Kubli fail to disclose or suggest all of the features recited in claims 4 or 11. It is respectfully requested the rejections of claims 4 and 11 be REVERSED.

3. Claims 5 and 12.

Claims 5 and 12 respectively depend from claims 1 and 8, and each recite the exhauster includes a rotatable body of revolution for exhaust, and the operating state detector includes a rotation detector that detects the change in the amount of or the molecular weight of the gas that collides with the rotor blades by detecting a rotation of the body of revolution. The examiner fails to point to any teachings in the cited references that either disclose or suggest this combination of features. Therefore, the examiner erred by failing to (1) make any finding of facts with respect to the subject matter of claims 5 or 12 upon which the final conclusion of obviousness was based, or (2) articulate the reasoning used to reach the legal conclusion of obviousness.

As discussed above in greater detail with respect to claims 1 and 8, Tsukazaki describes a laser-based system of particle monitoring, and Kubli describes an audio-based system for noise cancellation. Neither of these references disclose or suggest a rotation detector that detects the change in the amount of or the molecular weight of the gas that collides with the rotor blades by detecting a rotation of a body of revolution an exhauster.

Accordingly, the examiner's rejection of claims 5 and 12 is improper because even the combined teaching of Tsukazaki and Kubli fail to disclose or suggest all of the features recited in claims 5 and 12. It is respectfully requested the rejections of claims 5 and 12 be REVERSED.

4. Claims 17-19.

Claim 17 depends from claim 1 and recites the end point detector detects the end point of the cleaning by determining whether the amount of or the molecular weight of a gas colliding with the rotor blades stabilizes with the progress of the cleaning following a period of initially instability. Neither Kubli nor Tsukazaki make any mention whatsoever of determining an amount of or molecular weight of a gas that collides with the rotor blades of an exhauster, much less determining whether this amount stabilizes following a period of initial instability.

Nevertheless, the Final Action states "Regarding claim 17 specifically, the end point detector of the apparatus as per the Tsukazaki/Kubli teachings is fully capable of being used to detect the end point of a cleaning by determining whether the amount of a gas colliding with the rotor blades stabilizes with the progress of the cleaning following a period of initial

instability."[9] The examiner fails to point to any factual support in the record for this finding. Nor does the examiner articulate any reasoning whatsoever to support this conclusory statement. As such, the examiner's legal conclusion of obviousness improperly relies on conclusory a statement rather than sound reasoning with a rational underpinning. "[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006), *cited with approval in KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007).

Accordingly, the examiner's rejection of claim 17 is improper because even the combined teaching of Tsukazaki and Kubli fail to disclose or suggest all of the features recited in claim 17. It is respectfully requested the rejections of claim 17 be REVERSED.

Although dependent claims 18 and 19 recite additional features which are patentable, particularly in combination with the features of the claims from which they depend, to simplify issues on appeal, Appellants do not separately argue patentability of the remaining claims of this group. These claims are patentable at least by virtue of their respective dependence upon claim 17.

5. Claims 20 and 21.

With respect to the rejection of independent claims 20 and 21, it is noted these claims recites means-plus-function terminology, including:

> ...operating state detector means for detecting effects of collisions between a gas and the rotor blades so as to determine

[9] The Final Action, at page 5, lines 7-10.

> a change in an amount of or a molecular weight of the gas that passes through the exhauster; and
>
> means for detecting an end point of the cleaning [processing (claim 21)] based on a detection result from the operating state detector means.

Proper claim interpretation of a means-plus-function (35 U.S.C. § 112, sixth paragraph) element entails consideration of the structures disclosed in the specification and equivalents thereof. The sixth paragraph of 35 U.S.C. § 112, on construction of means-plus-function claims, "applies regardless of the context in which the interpretation of means-plus-function language arises, i.e. whether as part of patentability determination in the PTO or as part of the validity or infringement determination in a court." *In re Donaldson Co., Inc.*, 16 F.3d 1189 (Fed. Cir. 1994) (*En banc*). As set forth in M.P.E.P. § 2181, the Federal Circuit in *Donaldson* stated "Per our holding, the 'broadest reasonable interpretation' that an Examiner may give means-plus-function language is that statutorily mandated in paragraph six. Accordingly, the PTO may not disregard the structure disclosed in the specification corresponding to such language when rendering a patentability determination."

In determining the scope of the claims <u>prior to</u> determining compliance with each statutory requirement for patentability, M.P.E.P. § 2106 provides (emphasis added):

> USPTO personnel are to correlate each claim limitation to all portions of the disclosure that describe the claim limitation. This is to be done in all cases, <u>regardless of whether the claimed invention is defined using means or step plus function language</u>. The correlation step will ensure that USPTO personnel correctly interpret each claim limitation.

In the present case, the examiner disregards the structure disclosed in the specification that corresponds to the means-plus-function language in independent claims 20 and 21. For example, as illustrated in one example in Figure 5B of the present application, and as

describe at page 15, line 21 to page 17, line 3, and at page 22, line 25 to page 23, line 12 of the specification as originally filed, the structure disclosed in the specification that corresponds to the "operating state detector means for detecting effects of collisions between a gas and the rotor blades so as to determine a change in an amount of or a molecular weight of the gas that passes through the exhauster" includes a processor 84 that determines a change in an amount of or a molecular weight of the gas that passes through the exhauster. Figures 9, 12, 16 and 20 also illustrate examples that support the recitation in claims 20 and 21. Nevertheless, the examiner improperly disregarded the structure disclosed in the specification that determines a change in an amount of or a molecular weight of the gas that passes through the exhauster when rendering his obviousness determination. As such, the examiner applied an incorrect interpretation of claims 20 and 21, and failed to make a *prima facie* case of obviousness.

As discussed above with respect to claims 1 and 8, the combined teachings of Tsukazki and Kubli fail to disclose or suggest any device that performs the function of detecting an end point of a cleaning or a processing based on a detection result of a detection of effects of collisions between a gas and a rotor blade so as to determine a change in an amount of or a molecular weight of the gas that passes through an exhauster.

Accordingly, the examiner's rejection of claims 20 and 21 is improper because even the combined teaching of Tsukazaki and Kubli fail to disclose or suggest all of the features recited in claims 20 and 21. It is respectfully requested the rejections of claims 20 and 21 be REVERSED.

B. CONCLUSION

In view of the above remarks, Appellants respectfully request the rejections of the Final Action dated July 22, 2009 be REVERSED.

Respectfully submitted,

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VIII. CLAIMS APPENDIX

Claim 1 (Rejected): A substrate processing unit comprising:

a processing vessel that accommodates a substrate;

a cleaning gas supply system that supplies a cleaning gas into the processing vessel to be used in performing a cleaning of an interior of the processing vessel;

an exhauster that includes rotor blades that exhaust the interior of the processing vessel by rotation of the rotor blades;

an operating state detector that detects effects of collisions between a gas and the rotor blades so as to determine a change in an amount of or a molecular weight of the gas that passes through the exhauster; and

an end point detector that detects an end point of the cleaning based on a detection result from the operating state detector.

Claim 2 (Rejected): The substrate processing unit of claim 1, wherein the operating state detector includes a vibration detector that detects the change in the amount of or the molecular weight of the gas that collides with the rotor blades by detecting a vibration of the exhauster.

Claim 3 (Rejected): The substrate processing unit of claim 2, wherein the vibration detector includes a sound wave detector that detects a sound wave produced by the vibration of the exhauster.

Claim 4 (Rejected): The substrate processing unit of claim 2, wherein the end point detector detects the end point based on a change in the intensity of the vibration.

Claim 5 (Rejected): The substrate processing unit of claim 1, wherein the exhauster includes a rotatable body of revolution for exhaust, and the operating state detector includes a rotation detector that detects the change in the amount of or the molecular weight of the gas that collides with the rotor blades by detecting a rotation of the body of revolution.

Claim 8 (Rejected): A substrate processing unit comprising:

a processing vessel that accommodates a substrate;

a process gas supply system that supplies a process gas into the processing vessel to be used in performing a processing on the substrate;

an exhauster that includes rotor blades that exhaust an interior of the processing vessel by rotation of the rotor blades;

an operating state detector that detects effects of collisions between a gas and the rotor blades so as to determine a change in an amount of or a molecular weight of the gas that passes through the exhauster; and

an end point detector that detects an end point of the processing based on a detection result from the operating state detector.

Claim 9 (Rejected): The substrate processing unit of claim 8, wherein the operating state detector includes a vibration detector that detects the change in the amount of or the

molecular weight of the gas that collides with the rotor blades by detecting a vibration of the exhauster.

Claim 10 (Rejected): The substrate processing unit of claim 9, wherein the vibration detector includes a sound wave detector that detects a sound wave produced by the vibration of the exhauster.

Claim 11 (Rejected): The substrate processing unit of claim 9, wherein the end point detector detects the end point based on a change in the intensity of the vibration.

Claim 12 (Rejected): The substrate processing unit of claim 8, wherein the exhauster includes a rotatable body of revolution for exhaust, and the operating state detector includes a rotation detector that detects the change in the amount of or the molecular weight of the gas that collides with the rotor blades by detecting a rotation of the body of revolution.

Claim 17 (Rejected): The substrate processing unit of claim 1, wherein the end point detector detects the end point of the cleaning by determining whether the amount of or the molecular weight of a gas colliding with the rotor blades stabilizes with the progress of the cleaning following a period of initially instability.

Claim 18 (Rejected): The substrate processing unit of claim 17, wherein the operating state detector includes a vibration detector that detects a vibration of the exhauster.

Claim 19 (Rejected): The substrate processing unit of claim 18, wherein the vibration detector includes a sound wave detector that detects a sound wave produced by the vibration of the exhauster.

Claim 20 (Rejected): A substrate processing unit comprising:

a processing vessel that accommodates a substrate;

a cleaning gas supply system that supplies a cleaning gas into the processing vessel to be used in performing a cleaning of an interior of the processing vessel;

an exhauster that includes rotor blades that exhaust the interior of the processing vessel by rotation of the rotor blades;

operating state detector means for detecting effects of collisions between a gas and the rotor blades so as to determine a change in an amount of or a molecular weight of the gas that passes through the exhauster; and

means for detecting an end point of the cleaning based on a detection result from the operating state detector means.

Claim 21 (Rejected): A substrate processing unit comprising:

a processing vessel that accommodates a substrate;

a process gas supply system that supplies a process gas into the processing vessel to be used in performing a processing on the substrate;

an exhauster that includes rotor blades that exhaust the interior of the processing vessel by rotation of the rotor blades;

operating state detector means for detecting effects of collisions between a gas and the rotor blades so as to determine a change in an amount of or a molecular weight of the gas that passes through the exhauster; and

means for detecting an end point of the processing based on a detection result from the operating state detector means.

IX. EVIDENCE APPENDIX

None.

X. RELATED PROCEEDINGS APPENDIX

None.